

(12) **United States Patent**  
**Lu et al.**

(10) **Patent No.:** **US 10,315,481 B2**  
(45) **Date of Patent:** **Jun. 11, 2019**

(54) **SYSTEMS AND METHODS FOR VEHICLE DYNAMICS ASSIGNMENT**

USPC ..... 701/37-38; 280/6.157, 5.514, 5.515, 5.5  
See application file for complete search history.

(71) Applicant: **FORD GLOBAL TECHNOLOGIES, LLC**, Dearborn, MI (US)

(56) **References Cited**

(72) Inventors: **Jianbo Lu**, Northville, MI (US); **Davor David Hrovat**, Ann Arbor, MI (US); **Eric Hongtei Tseng**, Canton, MI (US); **Li Xu**, Northville, MI (US)

U.S. PATENT DOCUMENTS

(73) Assignee: **Ford Global Technologies, LLC**, Dearborn, MI (US)

4,634,142 A \* 1/1987 Woods ..... B60G 17/0155  
188/282.2  
5,165,838 A \* 11/1992 Kallansrude ..... B60G 17/0152  
198/782  
5,390,121 A 2/1995 Wolfe  
5,452,919 A \* 9/1995 Hoyle ..... B60G 17/0155  
280/5.505  
5,601,307 A \* 2/1997 Heyring ..... B60G 17/015  
280/6.157  
5,632,503 A 5/1997 Raad et al.  
(Continued)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/933,486**

OTHER PUBLICATIONS

(22) Filed: **Nov. 5, 2015**

An active suspension system for lunar crew mobility; Bill Bluethmann; Ed Herrera; Aaron Hulse; Josh Figuered; Lucien Junkin; Mason Markee; Robert O. Ambrose; 2010 IEEE Aerospace Conference; Year: 2010; pp. 1-9, DOI: 10.1109/AERO.2010.5446895.\*  
(Continued)

(65) **Prior Publication Data**

US 2017/0129298 A1 May 11, 2017

(51) **Int. Cl.**  
**B60G 17/015** (2006.01)

*Primary Examiner* — Cuong H Nguyen

(52) **U.S. Cl.**  
CPC ..... **B60G 17/015** (2013.01); **B60G 2400/10** (2013.01); **B60G 2400/204** (2013.01); **B60G 2400/25** (2013.01); **B60G 2400/32** (2013.01); **B60G 2400/39** (2013.01); **B60G 2400/41** (2013.01); **B60G 2400/52** (2013.01); **B60G 2400/80** (2013.01); **B60G 2400/841** (2013.01); **B60G 2400/843** (2013.01); **B60G 2500/30** (2013.01); **B60G 2800/914** (2013.01); **B60G 2800/9122** (2013.01)

(74) *Attorney, Agent, or Firm* — Jones Robb, PLLC; Raymond Coppiellie

(58) **Field of Classification Search**  
CPC ..... B60G 17/015; B60G 2800/9122; B60G 2400/10; B60G 2400/25; B60G 2400/32; B60G 2400/41; B60G 2500/30; B60G 2800/914

(57) **ABSTRACT**

Systems and method for assigning vehicle suspension dynamics are disclosed. Control signals that correspond to a current driving dynamic of a suspension system of a vehicle are generated. A vehicle state associated with the generated control signals is computed and a non-traditional suspension mode is selected. Based on the computed vehicle state and the selected suspension mode, a suspension height of the vehicle is adjusted.

**23 Claims, 3 Drawing Sheets**

